

Installation Climate Impacts Assessment Process

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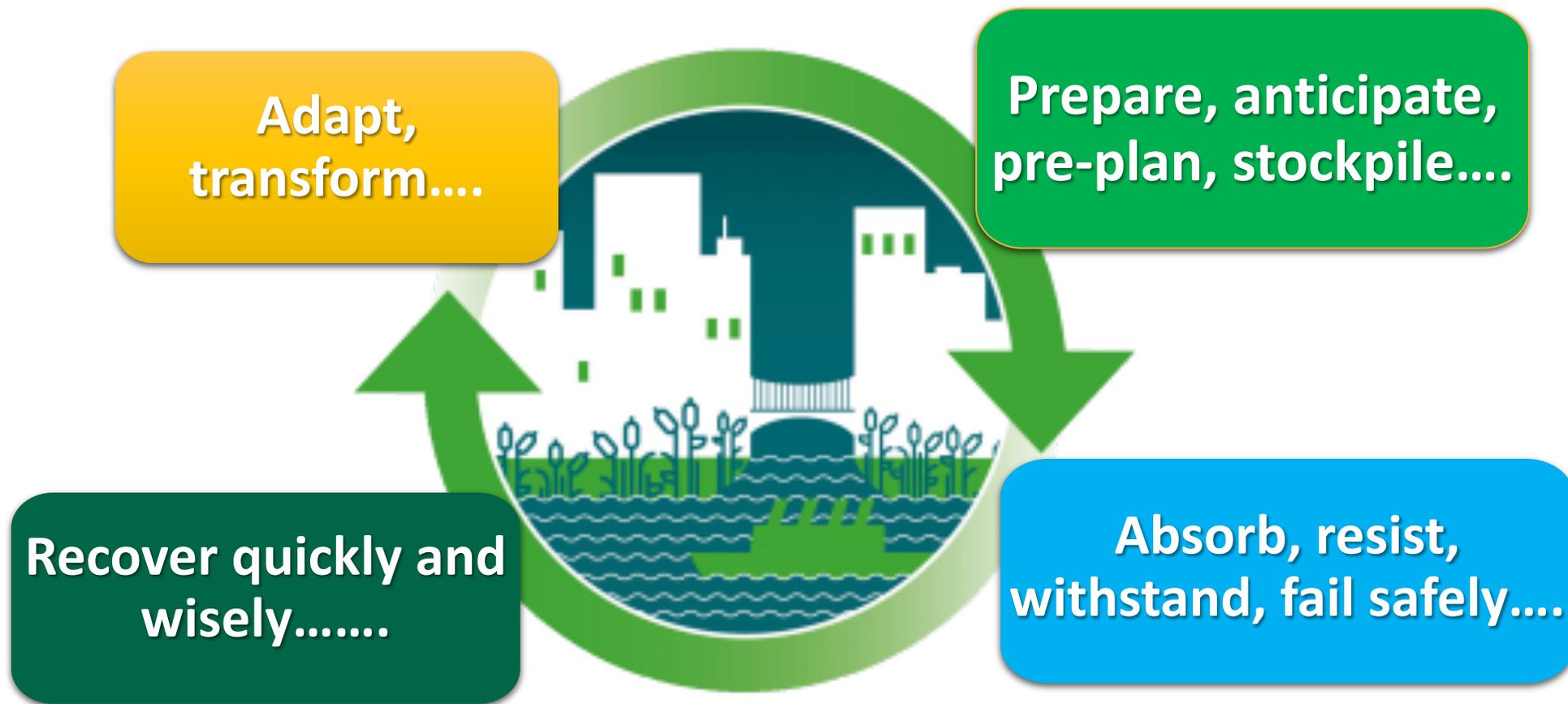


BLUF: Installation Resilience to Climate Change

- Department of Defense is already vulnerable to extreme events
- Climate change is a threat multiplier that is increasing over time
- Climate change vulnerability is a function of
 - **exposure** to the hazard(s)
 - **sensitivity** of the asset(s)
 - **adaptive capacity**
- Climate preparedness improves reliability of missions and operations and reduces response and recovery costs
- Prioritization supports effective and efficient preparedness and resilience investments



Climate preparedness and resilience



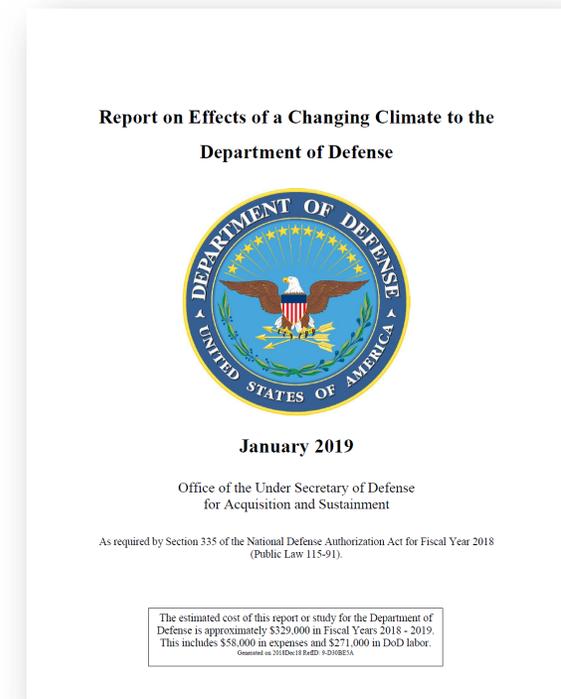
Why: National Security Issue

- **2018 National Defense Authorization Act Section 335**
 - Congress has identified climate change as a direct threat to the national security of the United States that impacts stability in areas of the world both where the United States Armed Forces are operating today, and where strategic implications for future conflict exist.
 - Congress acknowledges that there are complexities in quantifying the cost of climate change on mission resilience. Despite these complexities, the Department of Defense must ensure that it is prepared to conduct operations both today and in the future and that it is prepared to address the effects of a changing climate on threat assessments, resources, and readiness.
 - Furthermore, military installations must be able to effectively prepare to mitigate climate damage in their master planning and infrastructure planning and design, considering the weather and natural resources most pertinent to them [e.g., *U.S. Department of Defense (DOD), 2018*]

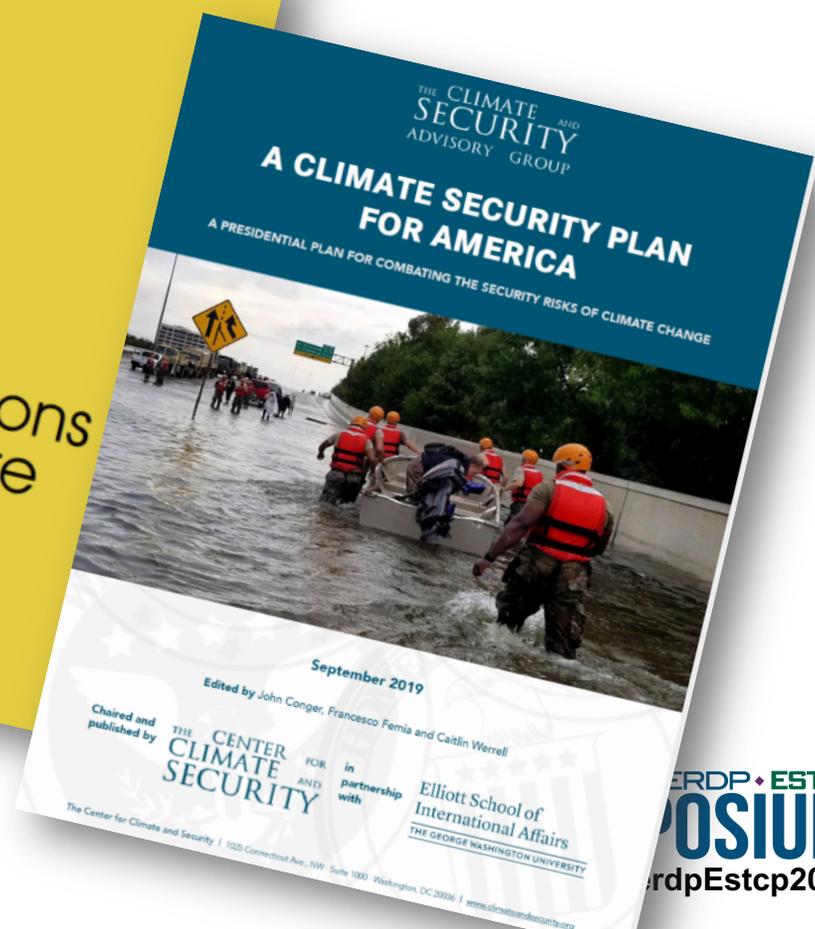
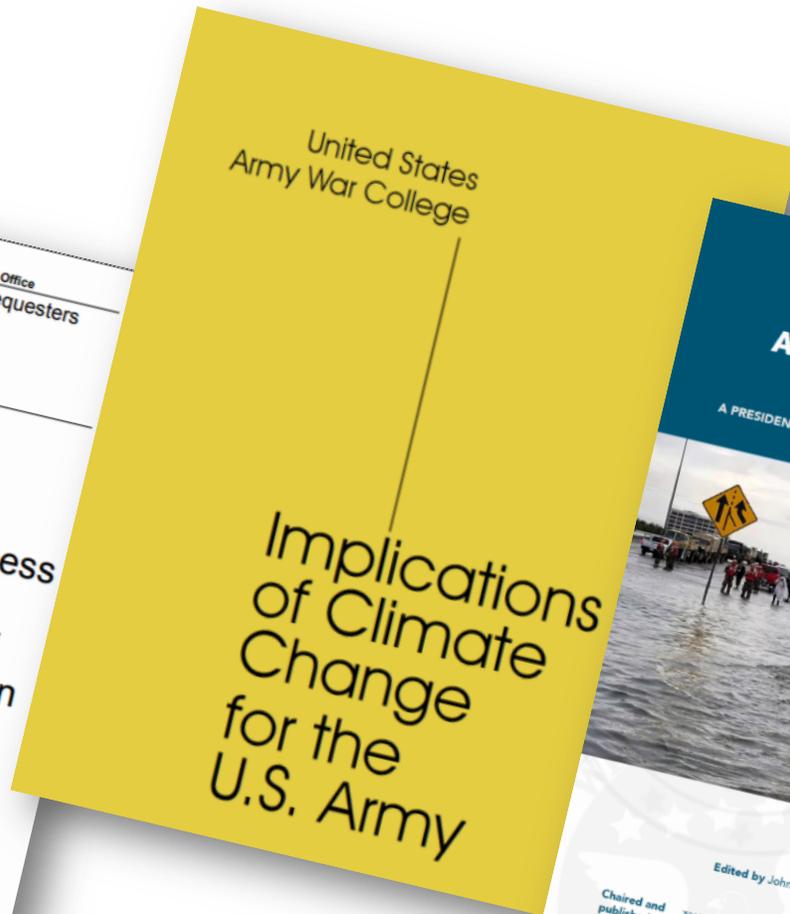
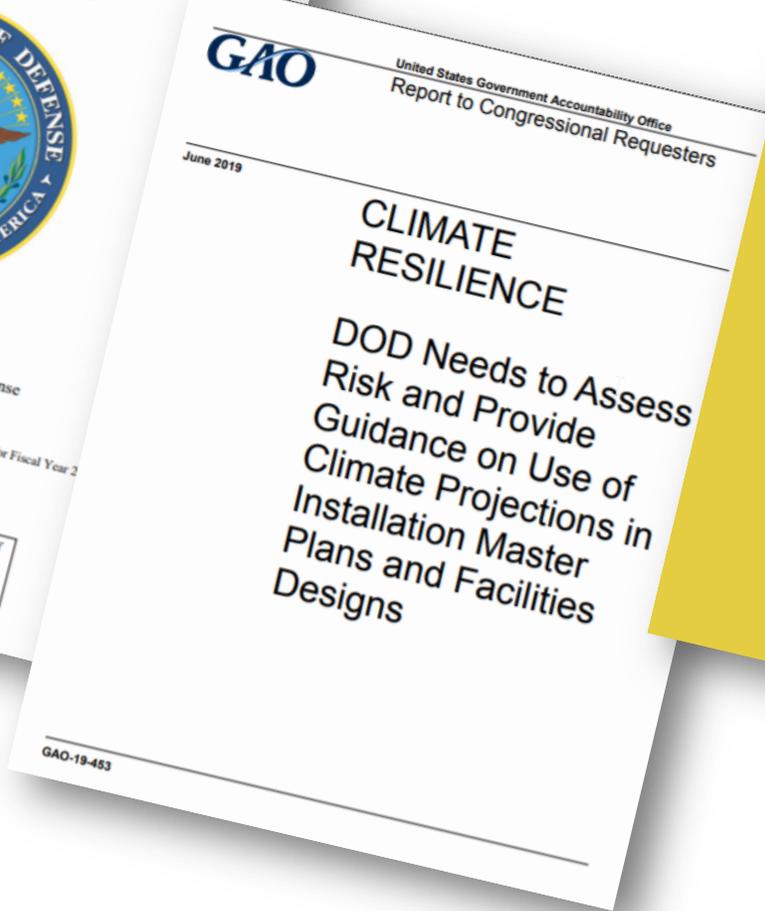
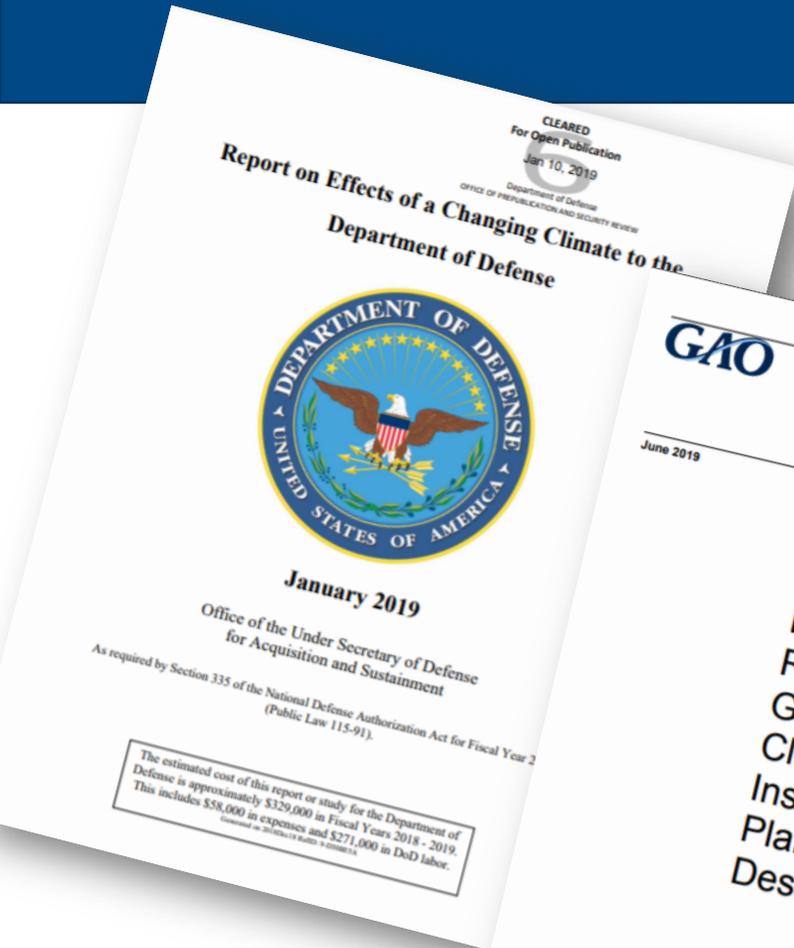


DoD Section 335 Report to Congress

- Operations impacts of changing climate can change the manner in which DoD maintains readiness and provides support and what DoD may be asked to support
 - Arctic regions
 - Humanitarian assistance – disaster relief
 - Defense support of civil authorities
 - Testing and training
- Increasing installation resiliency
 - Examples
 - Research
- Ensure mission resiliency, e.g., by working with partner nations

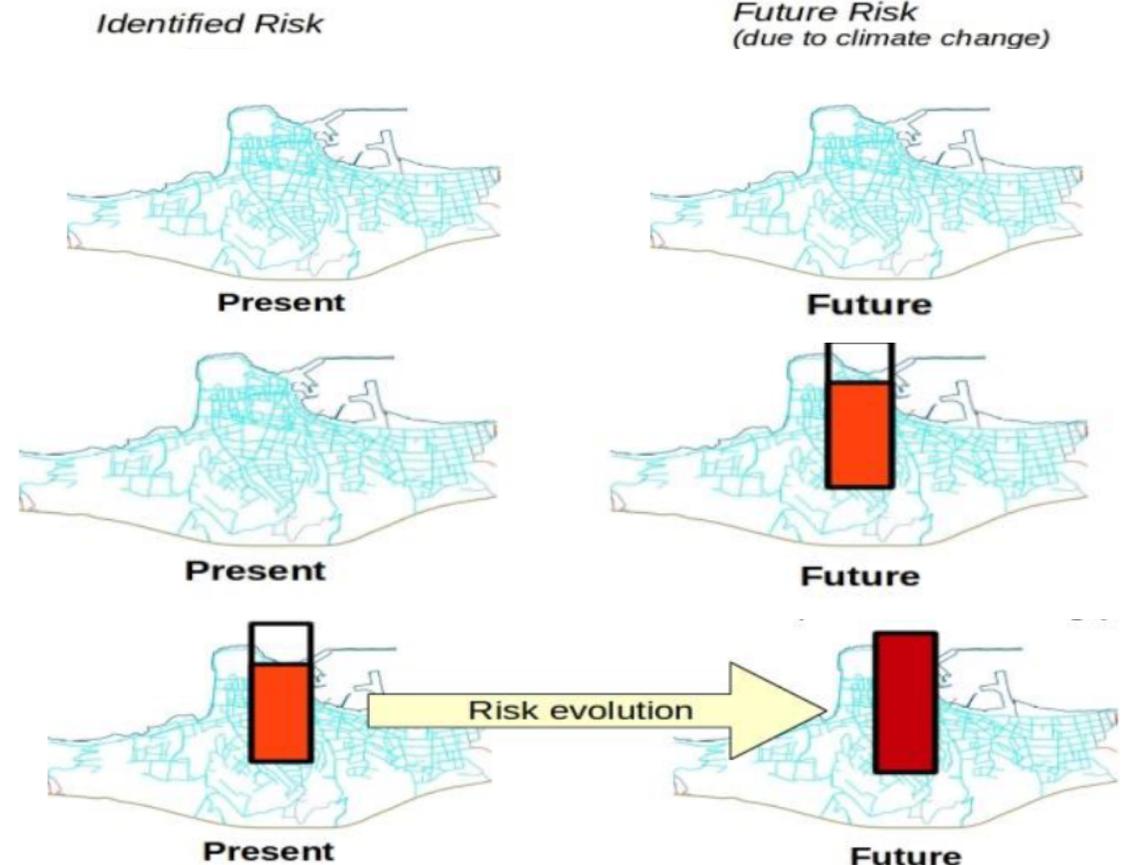
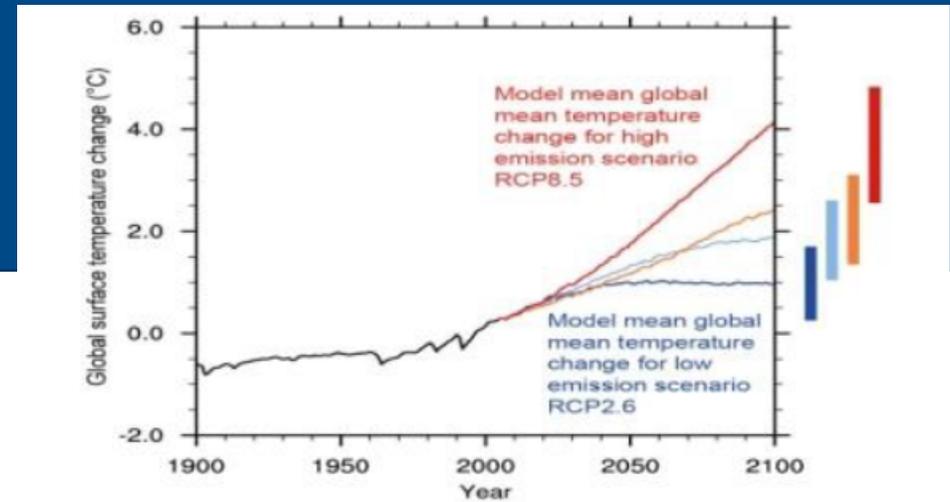


Selection of Relevant 2019 Climate Risk Reports

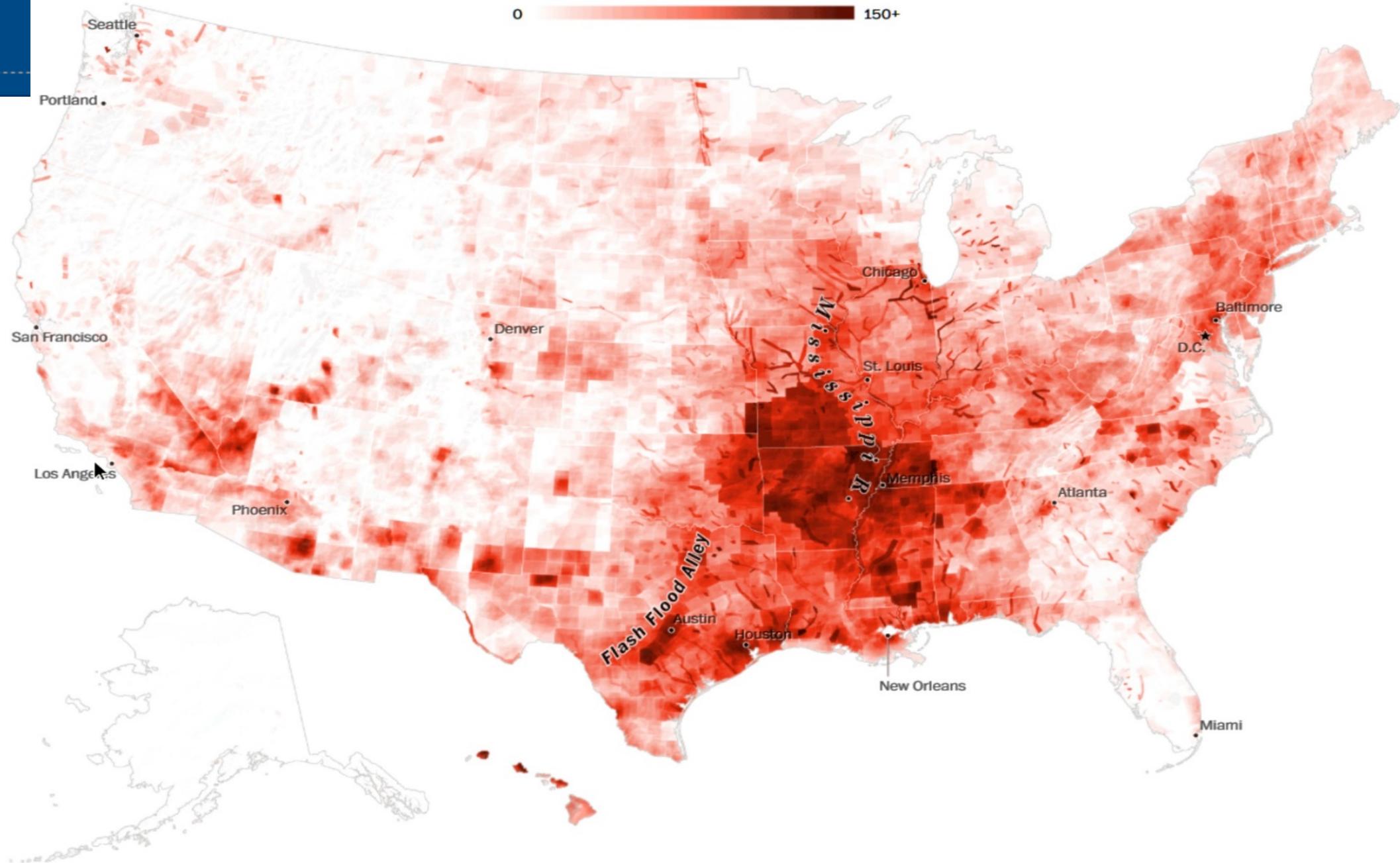


When: Preparedness and Resilience Action

- Are any climate risks already existing?
- Are any climate risks imminent or expected to occur in the near term?
- Are any climate risks expected to evolve over time as climate changes or as missions and operations change?
- What are the approximate timeframes for these risks to occur?



Where



Where

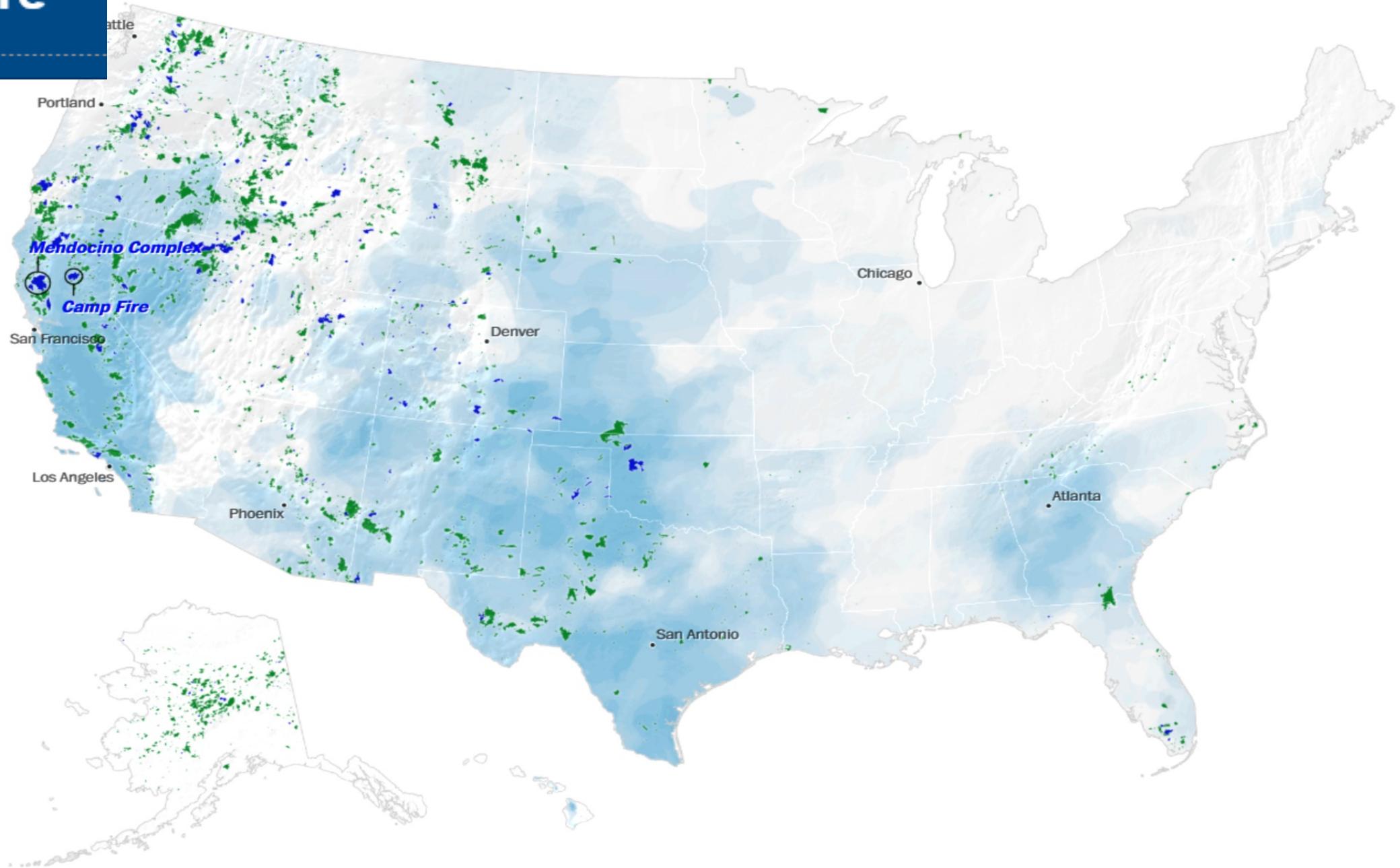
Wildfire perimeters

2008-2017

2018

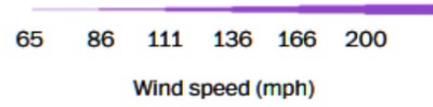
Number of weeks of extreme or exceptional drought since 2008

0 150+

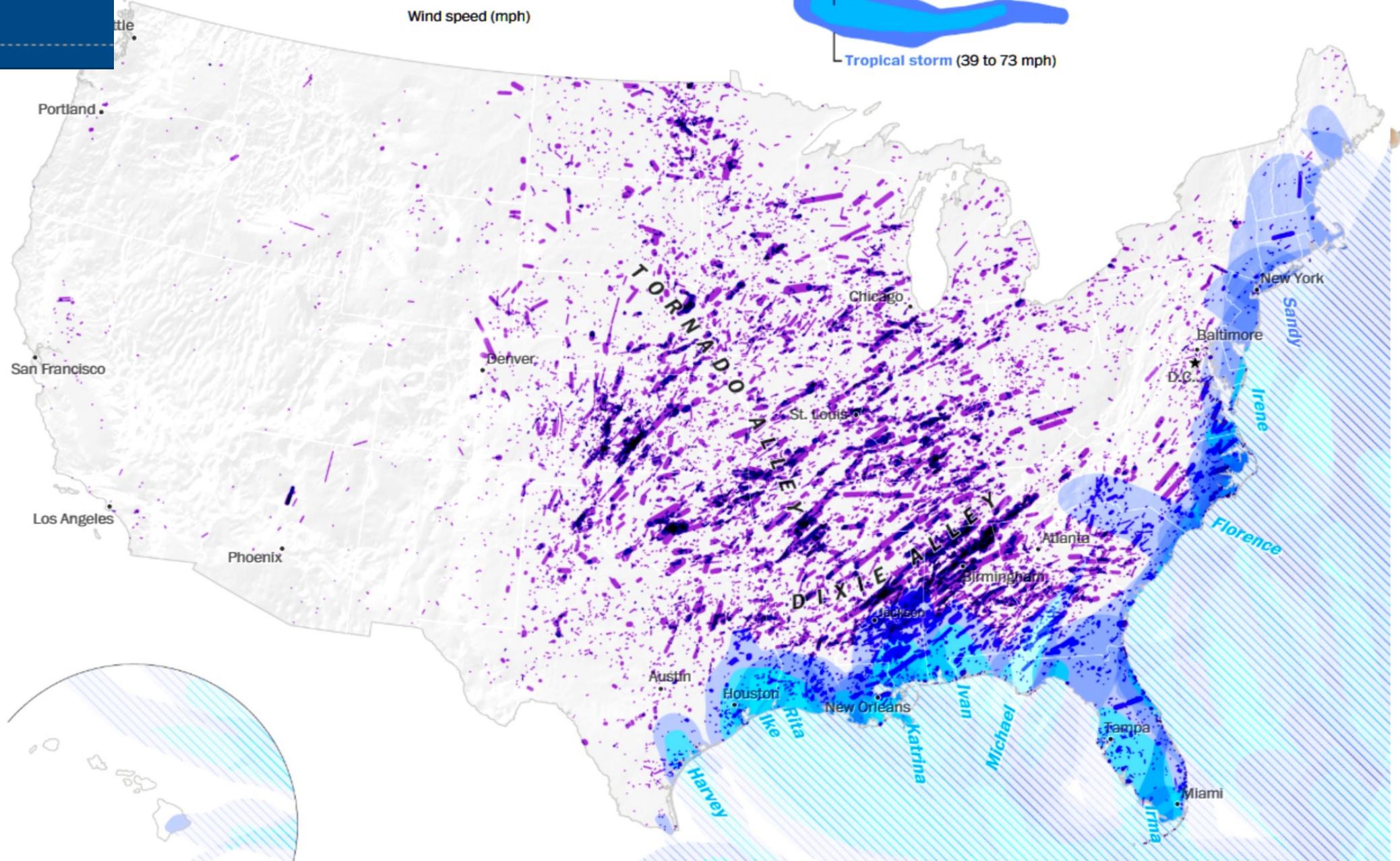
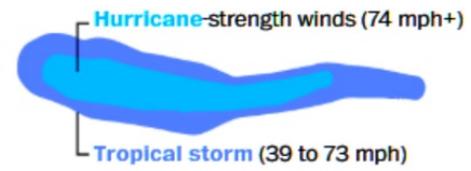


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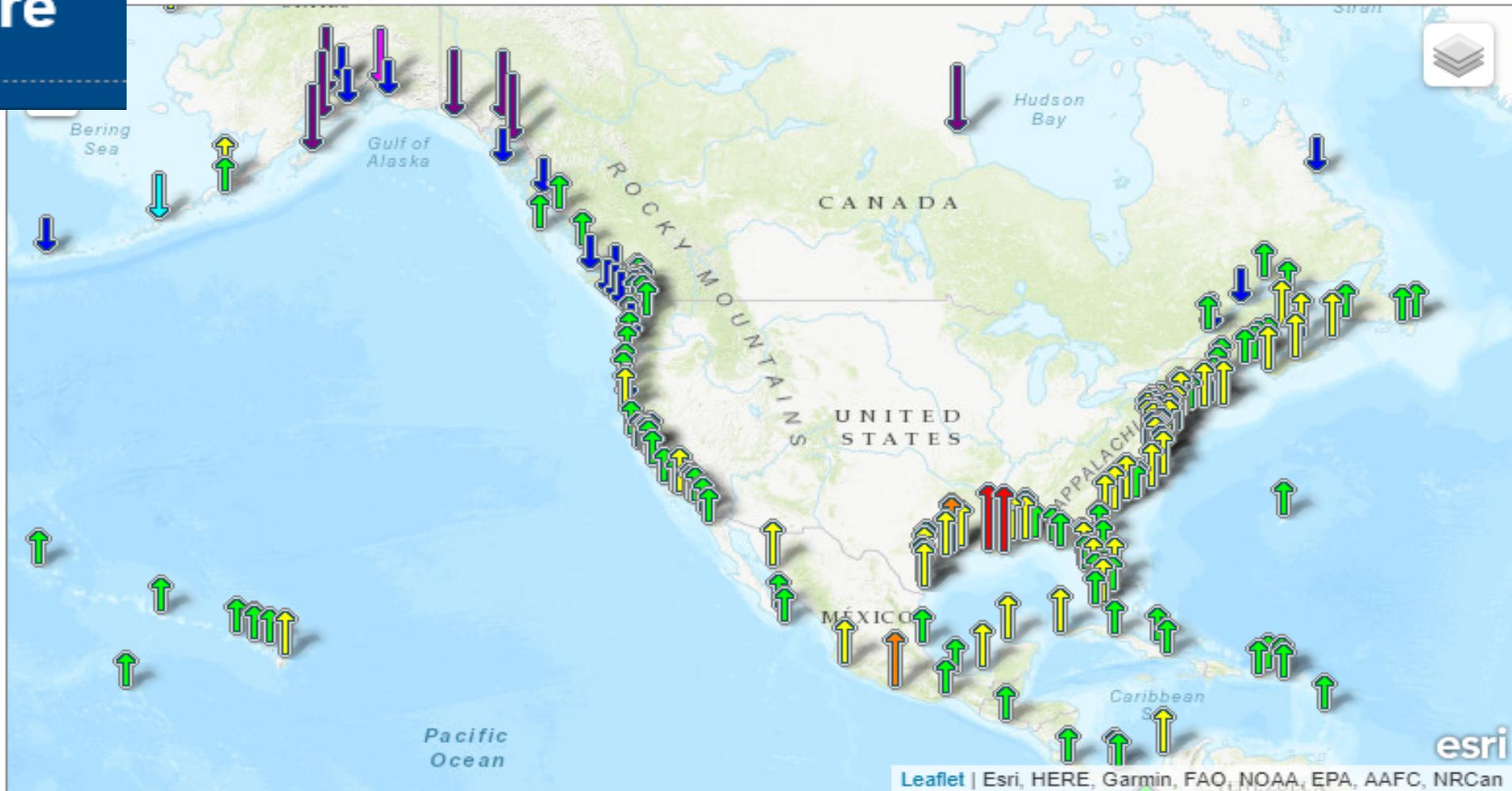
Tornadoes since 2004



Hurricanes and tropical storms since 2004



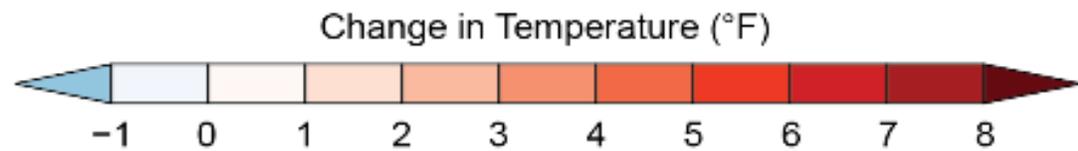
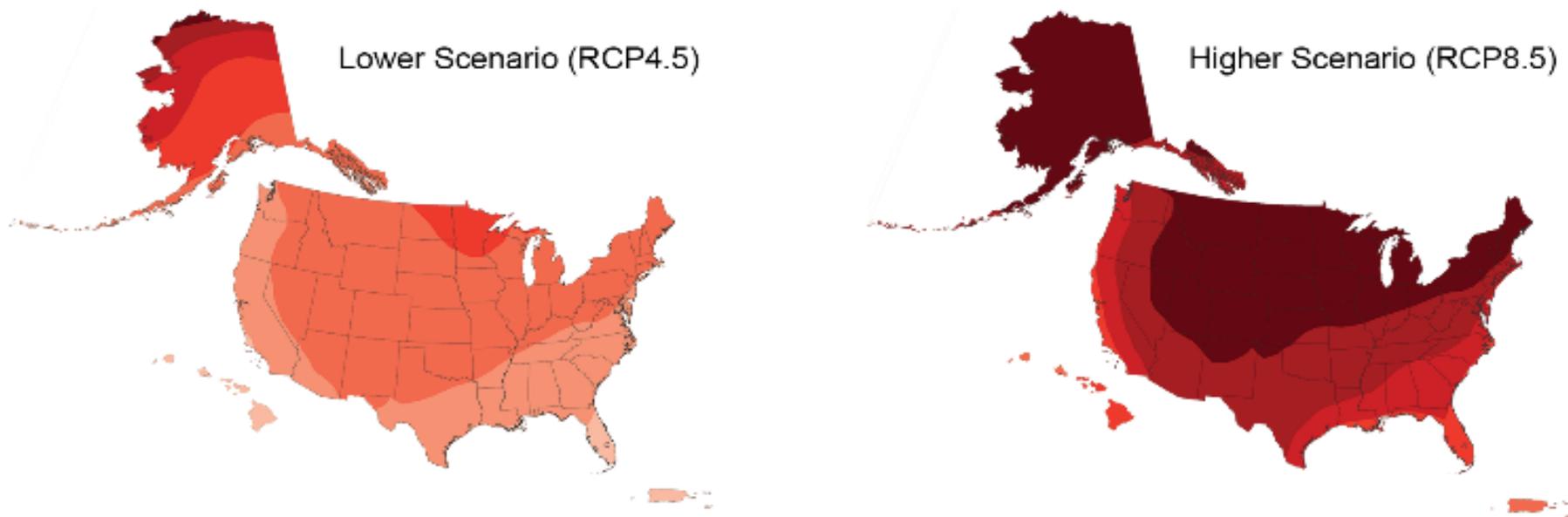
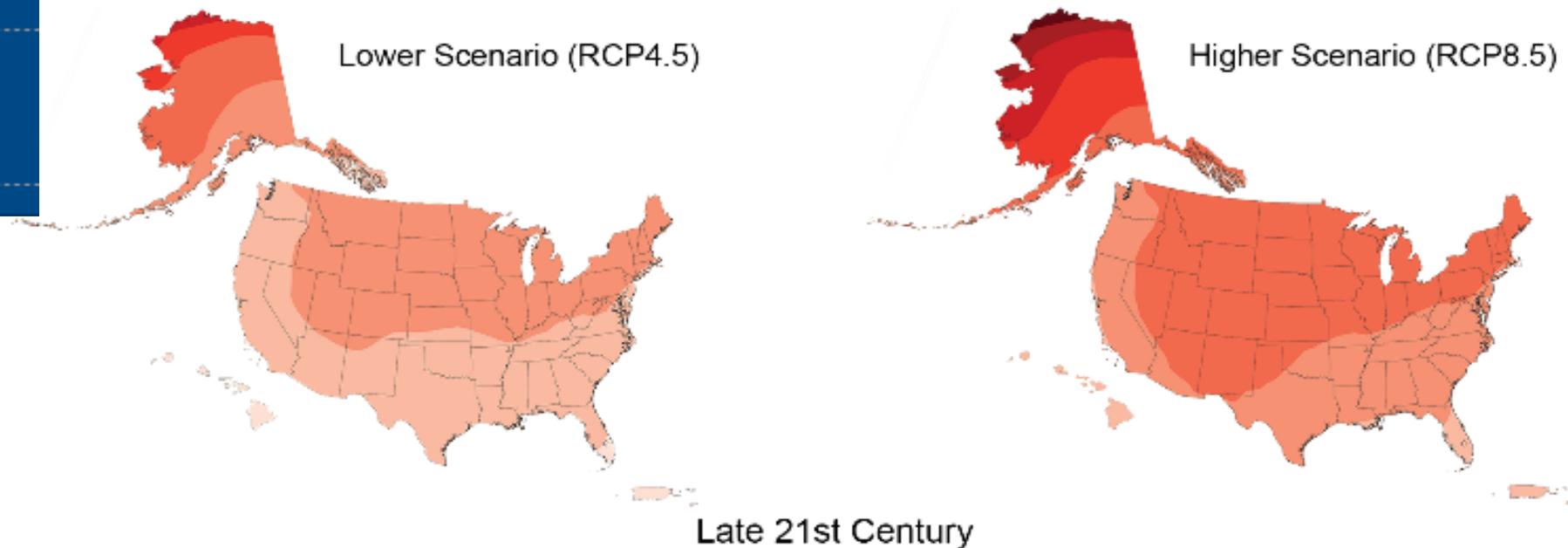
Where



The map above illustrates relative sea level trends, with arrows representing the direction and magnitude of change. Click on an arrow to access additional information about that station.

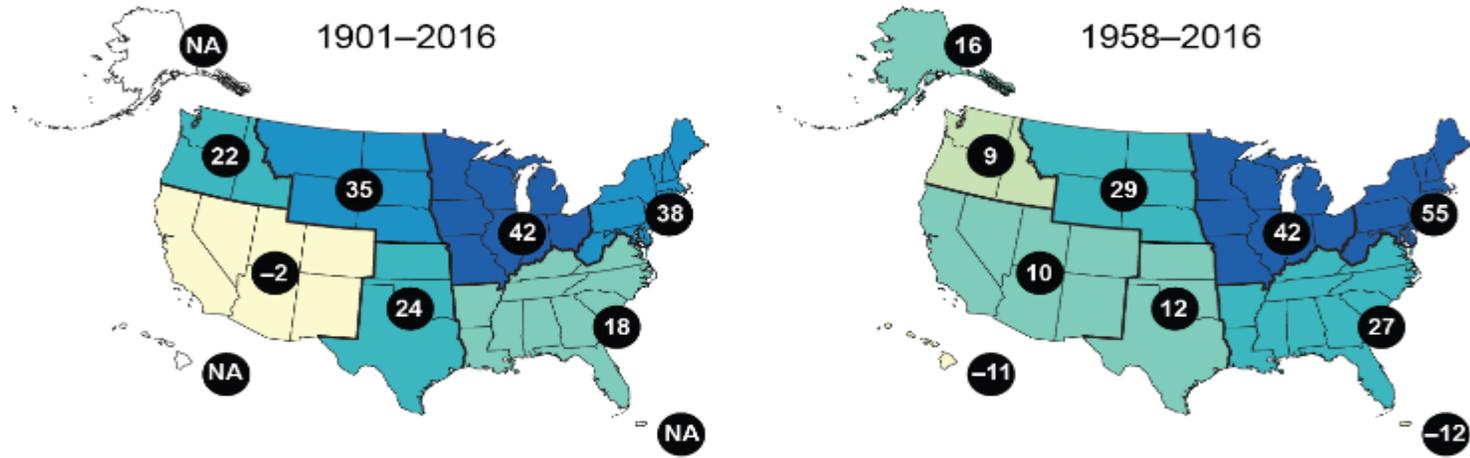


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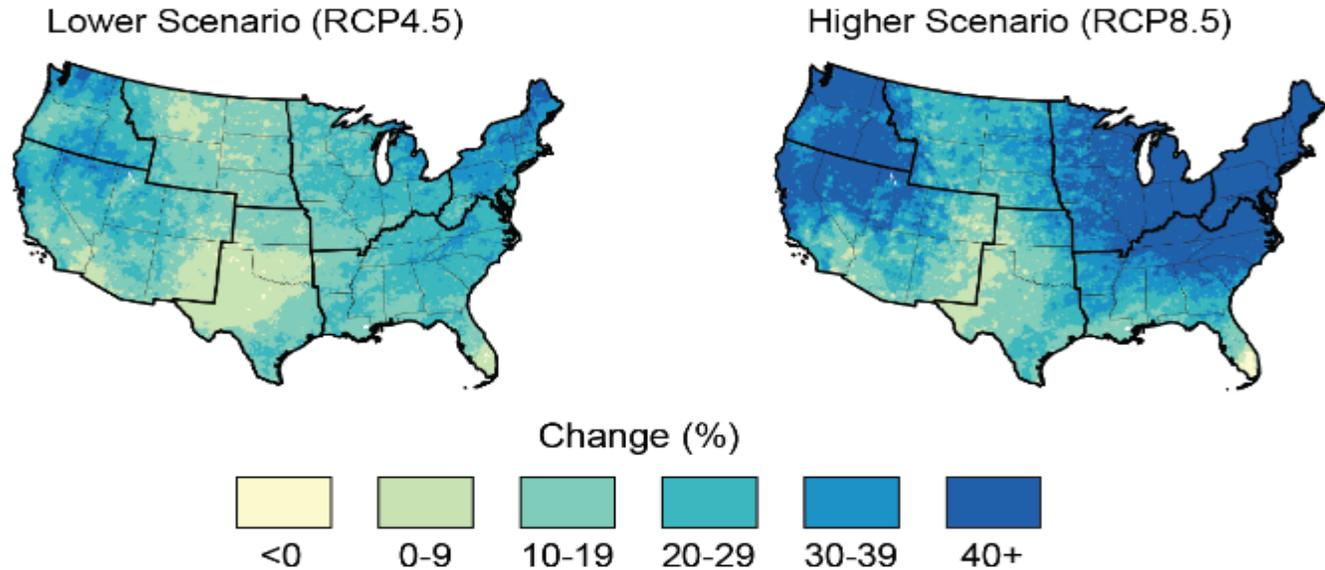


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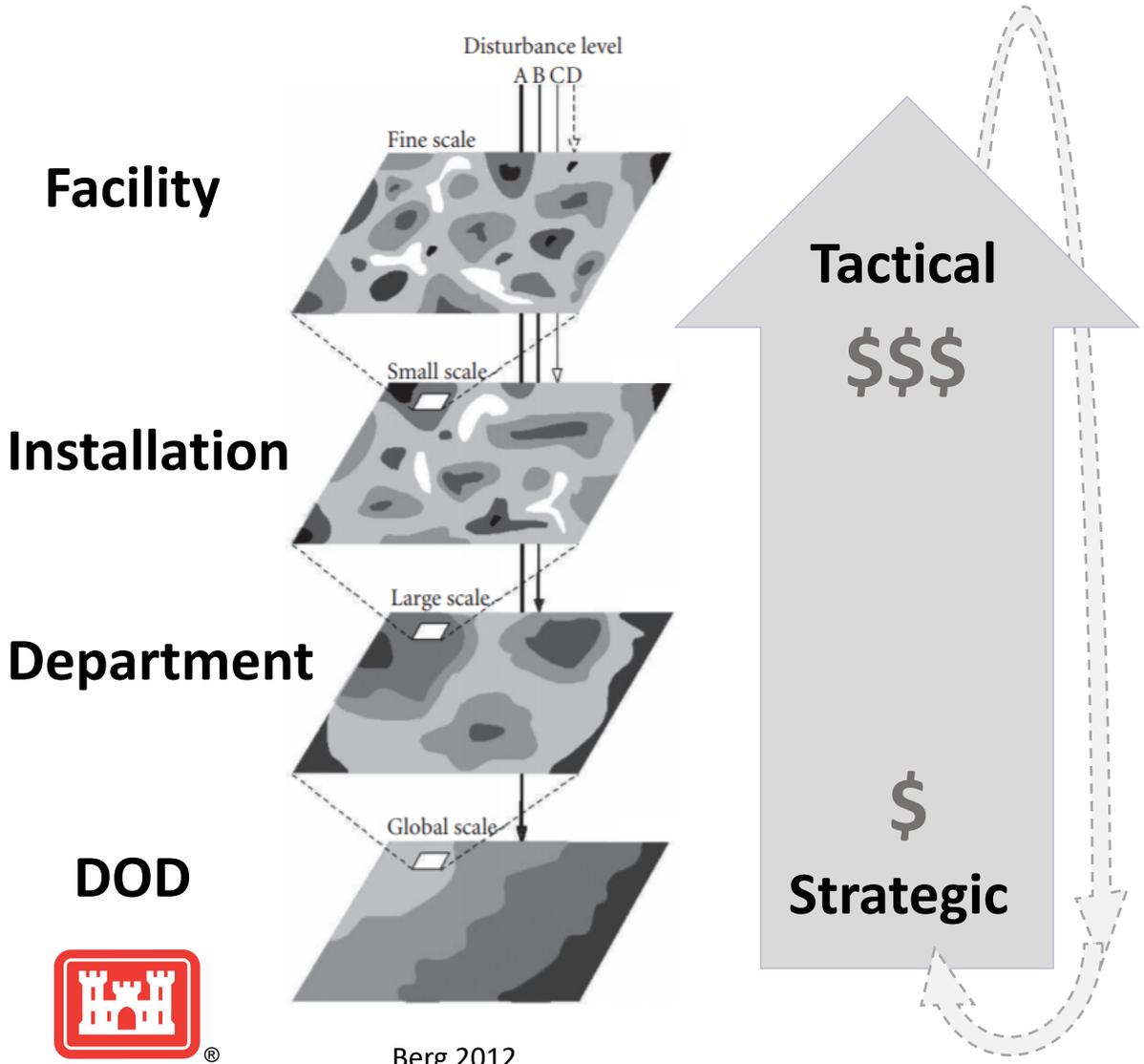
Observed Change in Total Annual Precipitation Falling in the Heaviest 1% of Events



Projected Change in Total Annual Precipitation Falling in the Heaviest 1% of Events by Late 21st Century



How: Phased Assessment

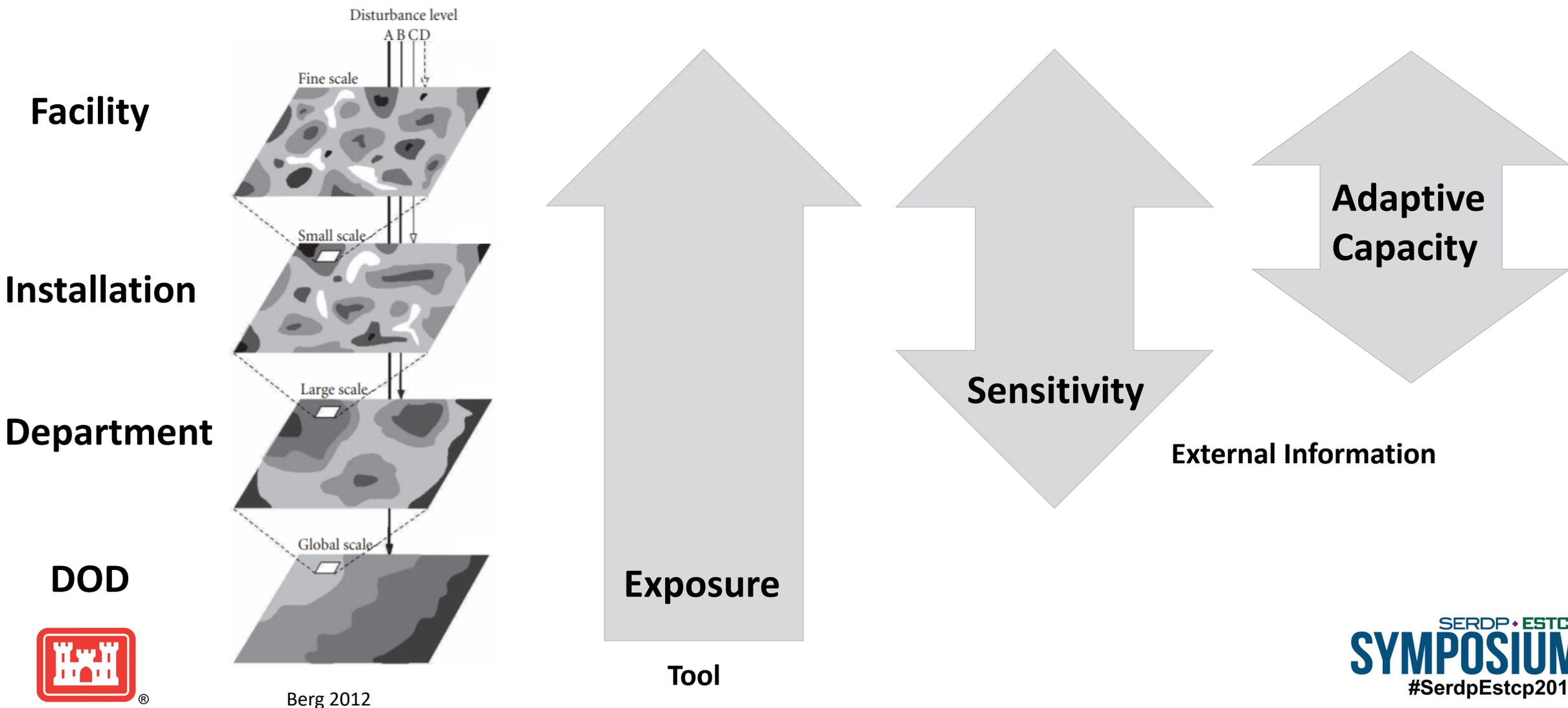


- Implementation, monitoring, lessons learned
- Assess at scales consistent with risks/consequences
- Prioritize preparedness and resilience measures at Department/service/command/ installation level
- Manage risks
- Allocate resources
- Modify or adjust operations and missions
- Conduct more detailed planning and design of resilience measures,

- Assess risks and prioritize across organizational units
- Allocate resources at Department level
- Modify or adjust standards and criteria
- Evolve operations and missions in dynamic conditions



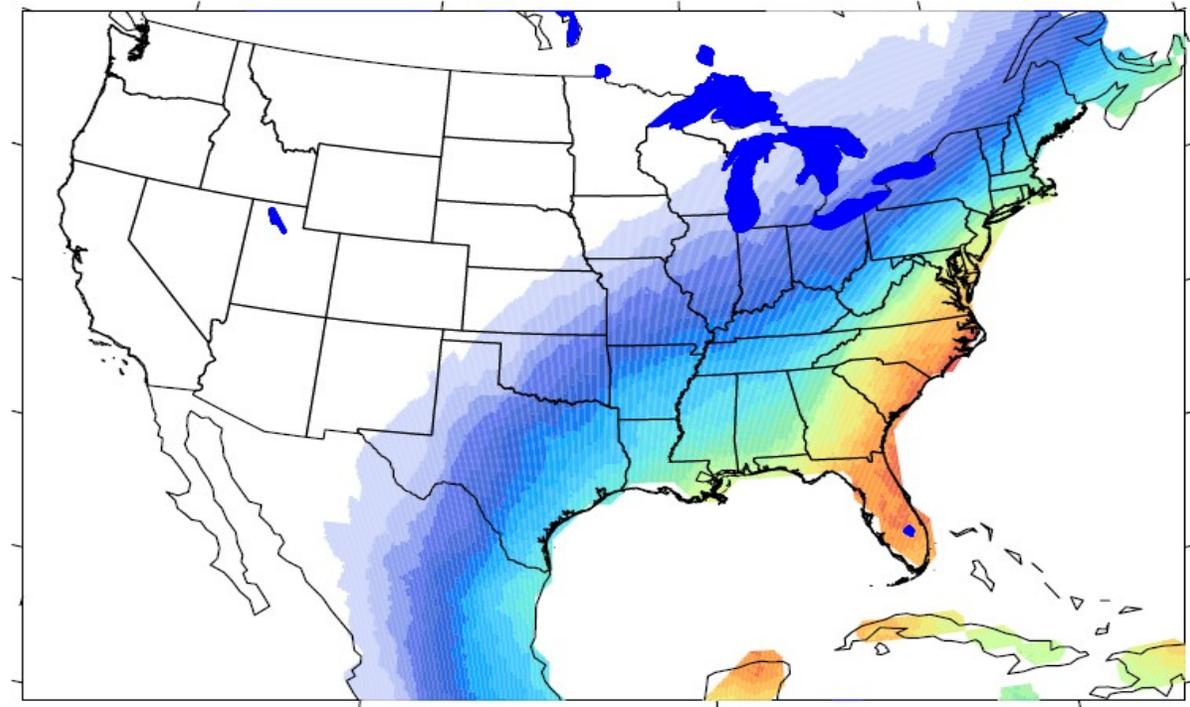
How: Geospatial Indicator-Based Assessment



Geospatial Indicators Representing Exposure

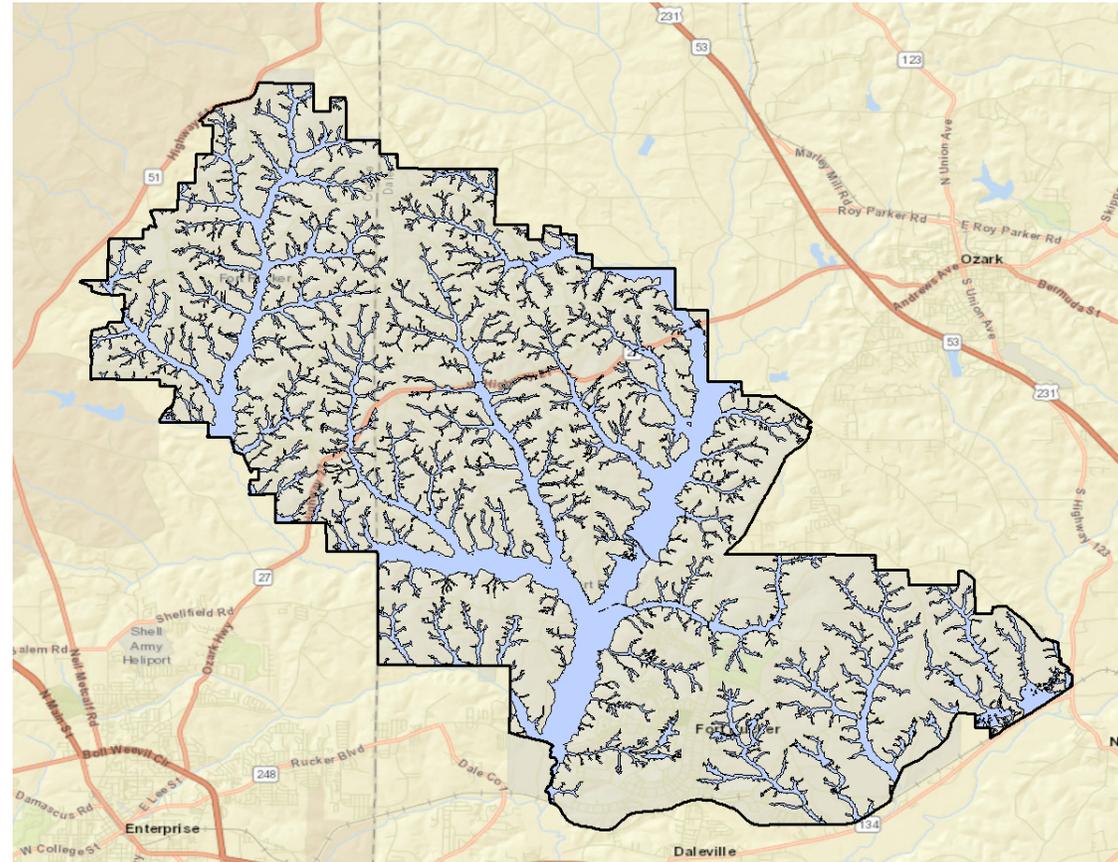
- Indicators based on existing nationally-consistent data from authoritative sources (NOAA, USGS, EPA, USDA, FEMA, USACE...)
 - Coastal total water levels
 - Coastal erosion
 - Riverine flooding
 - Desertification
 - Drought
 - Wildfire and wildland fire
 - Thawing permafrost
 - Historic extreme weather events
 - Aircraft lift capacity

Avg # TC/yr within 500 km during the period 1948-2018



Example: Riverine Flooding

- Indicator combines FEMA mapping of 1% Annual Exceedance Probability (AEP) flooding (rivers and larger tributaries) plus 2-D HEC RAS to capture tributary flooding
- 10 m DEM used in CONUS
- Automated routine for adding 2 ft and 3 ft per NDAA 19 Section 2805
- Indicator: % area inundated at 1% AEP with intermediate product: shapefiles



Screening-Level DOD Climate Assessment

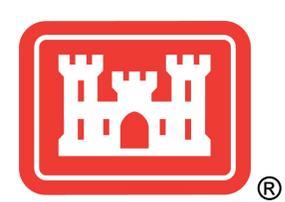
- DoD Climate Assessment will
 - Produce a screening-level analysis of climate impacts to ~ 180 selected locations for 30-yr epochs averaged at 2050 and 2085 CONUS and OCONUS
 - Improve understanding of the relative exposure of these locations to the effects of extreme weather and climate impacts represented by geospatial indicators
 - Support risk-informed decision making about potential future assessments at finer scales with more local information



Screening-Level DOD Climate Assessment

- DoD Climate Assessment will
 - Provide information about climate preparedness and resilience measures and rough order of magnitude costs for common exposures seen across locations
 - Incorporate additional high-level information on sensitivity to help inform high-level planning decisions (but NOT replace more detailed local installation planning)





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